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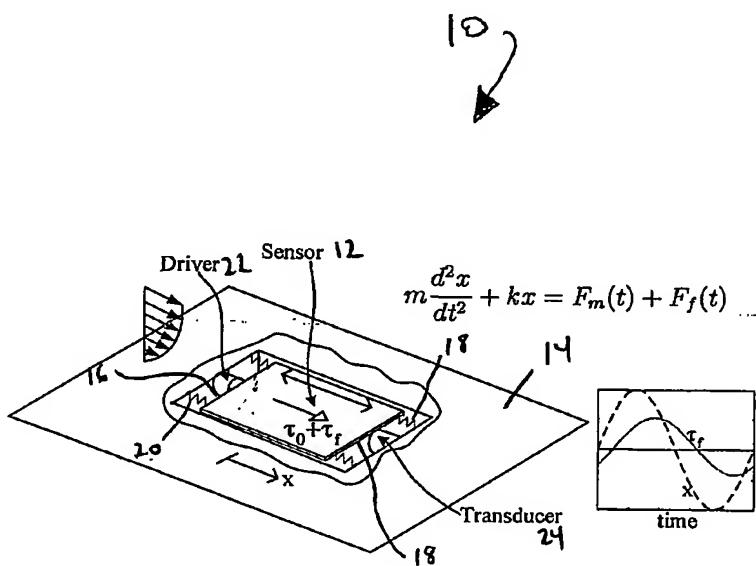
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[Continued on next page]

(54) Title: OSCILLATORY MOTION BASED MEASUREMENT METHOD AND SENSOR FOR MEASURING WALL SHEAR STRESS DUE TO FLUID FLOW



Schematic of dynamic resonant shear stress sensor with the governing equation and a time history of the fluctuating shear force on the sensor (from a simulation). A cutaway view of the sensor is shown to display components below the surface.

(57) Abstract: A shear stress sensor for measuring fluid wall shear stress on a test surface is provided. The wall shear stress sensor is comprised of an active sensing surface and a sensor body. An elastic mechanism mounted between the active sensing surface and the sensor body allows movement between the active sensing surface and the sensor body. A driving mechanism forces the shear stress sensor to oscillate. A measuring mechanism measures displacement of the active sensing surface relative to the sensor body. The sensor may be operated under periodic excitation where changes in the nature of the fluid properties or the fluid flow over the sensor measurably changes the amplitude or phase of the motion of the active sensing surface, or changes the force and power required from a control system in order to maintain constant motion. The device may be operated under non-periodic excitation where changes in the nature of the fluid properties or the fluid flow over the sensor change the transient motion of the active sensor surface or change the force and power required from a control system

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to maintain a specified transient motion of the active sensor surface.



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